

A review of the genus *Astomella* Lamarck in southern Africa, with the description of two new species (Diptera: Acroceridae: Panopinae)

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Astomella deserticola and *A. montana* are described from southeastern Namibia and the Natal Drakensberg respectively. Further records of *A. capensis* Schlinger and *A. gessi* Barraclough from Natal and the eastern Transvaal are listed and discussed. A generic diagnosis and a revised key to the southern African species of *Astomella* are provided, while the regional distribution is evaluated.

INTRODUCTION

The Acroceridae is an ancient relict family of brachycerous Diptera, which are the only truly coevolved and host-restricted parasitoid flies attacking spiders (Schlinger 1987). *Astomella* Lamarck belongs to the Panopinae, the most primitive subfamily, members of which exclusively attack trapdoor spiders (the suborder Mygalomorphae). Adults are usually robust bee-like flies with dark ground colour and yellow markings, and have conspicuously pendent antennae (Fig. 1). Nothing is known about female oviposition; eggs of other Acroceridae are deposited in high numbers (up to 5000 per female) and dropped by the female in flight or deposited on twigs, grass stems or tree trunks away from intended hosts (Schlinger 1975). The life history is remarkable in that upon hatching the first instar larva needs to actively seek out and penetrate spiders, which are predominantly fossorial and inaccessible in burrows (sometimes with a sealed entrance). *Astomella* has been reared from Ctenizidae and Theraphosidae in the southern Palaearctic Region (Schlinger 1987) and from *Moggridgea crudeni* Hewitt (Migidae) in South Africa (Barraclough 1984).

An elucidation of species relationships within *Astomella* is of interest to both systematists and biogeographers as the genus is clearly old and has an apparently relictual distribution in restricted parts of the Palaearctic, Afrotropical and Oriental regions. The four Palaearctic species are limited to an area adjacent to the Mediterranean in southern Europe (from Portugal eastwards to Greece), the Middle East (Turkey southwards to Israel), and Algeria in North Africa (Nartshuk 1988). The Oriental fauna appears to be depauperate, with two species described from Sri Lanka and Vietnam (Schlinger 1975), although further species may await discovery. The genus has not been recorded from Australasia/Oceania. Until fairly recently only two species were known from the Afrotropical Region (Tanzania; South Africa), but I have described an additional three species from South Africa (Barraclough 1984). The present description

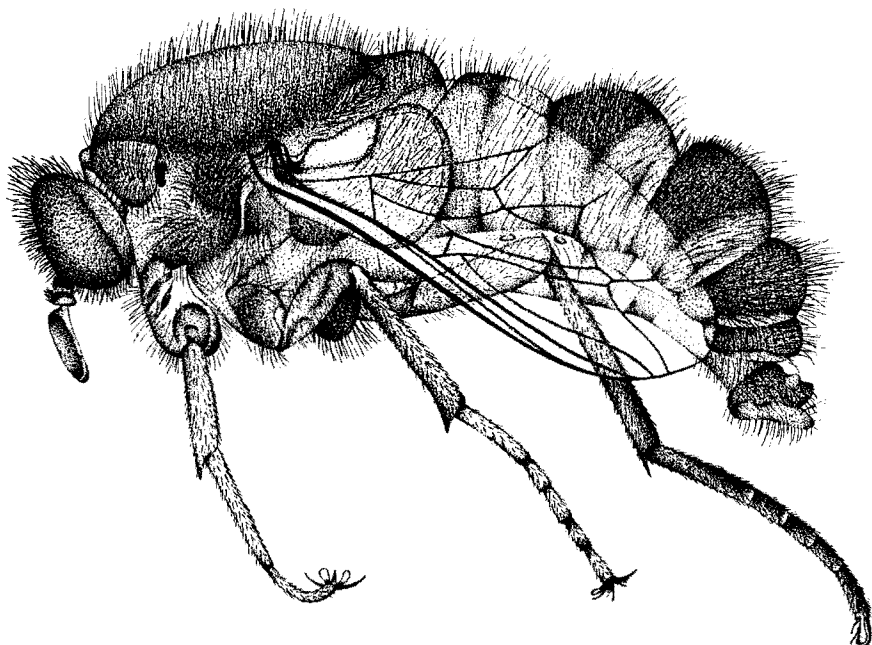


Fig. 1. *Astomella capensis* Schlinger, male, lateral habitus.

of a further two southern African species means that a total of seven species are now recorded from the Afrotropical Region, six of which (almost half the world fauna) are endemic to southern Africa.

The remarkably disjunct distribution of *Astomella* in Africa is of particular interest. A grouping of five species is restricted to eastern South Africa, with a single species from southeastern Namibia (Fig. 10), the latter being related not to the South African species but to *A. acuta* Schlinger, 1959 from northwestern Tanzania. Although this distribution is difficult to interpret (and assuming that no intervening species await discovery), I can briefly offer two possible explanations. The first is that the Namibian and Tanzanian species are relictual elements of a lineage, originally with a much wider distribution. The second explanation is merely that the disjunct distribution reflects the abundance/distribution patterns of mygalomorph hosts, which may be similarly disjunct.

Schlinger (1960) noted that no Acroceridae were recorded from Namibia, Angola or Botswana and suggested that the Namib and Kalahari deserts could act as geographical barriers. The discovery of an *Astomella* species in Namibia negates this theory, and as such arid regions have numerous potential spider hosts (particularly mygalomorphs), future records of similar panopine Acroceridae should be expected. All southern African Panopinae have rudimentary mouthparts and almost certainly do not feed, consequently the possibly very limited opportunities to take nectar at blossom would not be a factor restricting distribution in arid regions. Such limited opportunities do, however, probably exclude the widely distributed acrocerine genus *Psilodera* Gray from the arid regions of southern Africa. *Psilodera* has a very well developed proboscis

and is regularly collected whilst visiting the blossom of shrubs on forest margins. It is widespread in the eastern half of southern Africa, with a range extension along the coast of the Cape Province as far west as Cape Town.

MATERIALS and METHODS

This study was based on pinned adult flies deposited in the following collections, which are subsequently referred to only by their respective acronyms:

BMNH – The Natural History Museum, London

NMSA – Natal Museum, Pietermaritzburg

SAMC – South African Museum, Cape Town

SANC – National Collection of Insects, Plant Protection Research Institute, Pretoria.

The terminology used in the generic diagnosis, key and descriptions is based predominantly on that of McAlpine (1981), Schlinger (1960, 1981) and Barracough (1984).

Descriptions are based on the holotypes, but are supplemented with information derived from paratypes, where relevant. Such supplementary information is given in parentheses. Bilaterally symmetrical structures are always described in the singular. Measurements of holotypes are given in parentheses.

Holotype label data are quoted exactly as they appear. A slash (/) denotes the commencement of a new line. Significant supplementary or qualifying information is presented in square parentheses when considered necessary.

TAXONOMY

Genus *Astomella* Lamarck

Type-species: *Astomella hispaniae* Lamarck, 1816 (Palearctic), by monotypy.

Diagnosis (relative to Afrotropical genera of Panopinae): Antenna inserted below antennal tubercle within lower two-fifths of head height, well developed and pendent, male flagellum partly or entirely broader than scape and pedicel in profile, sometimes noticeably tapered apically. Eyes contiguous between ocellar and antennal tubercles, but separated below antennal insertions as far as margin of buccal cavity. Ocelli not visible. Eyes pilose. Lower calypter broad and well developed, surface area much greater than that of scutellar disc; haired on upper surface. Wing with relatively extensive venation, including several crossveins; basal radial, basal medial, posterior cubital, r_{4+5} and m_3 cells developed, latter 3 cells closed before wing margin; third radial vein simple, not forked; vein M_2 lacking. Female terminalia positioned about midway along abdominal venter, sternites consequently very small and anteroventrally displaced.

Discussion: I concur with Nartshuk (1988) in provisionally excluding *Pterodontia* Gray from the Panopinae and *Astomella* is not diagnosed relative to this genus. Schlinger (1960) placed *Pterodontia* in Panopinae based on the development of tibial spurs, but this character state could prove to be homoplastic within the Acroceridae.

Key to southern African species of *Astomella*

1. Postpronotum with dark ground colour. Scutum with black pile anteromedially. Fore coxal pile partly dark; femoral pile predominantly dark. Abdominal terga nearly always entirely

- dark brown to black, pale fasciae lacking along hind margins *minuta* Barraclough
- Postpronotum translucent white to yellow (pale relative to dark ground colour of scutum). Scutum with yellow pile anteromedially. Coxal and femoral pile always entirely pale. Abdominal terga with conspicuous yellow fasciae along hind margins (best developed on T₂ and T₃, particularly in males) 2
2. Scutum strikingly yellow laterally, in contrast to dark ground colour; pale region noticeably broader posterior to postpronotum (Fig. 3) and reaching anterior margin of postalar callus. Anepisternum with 2 distinct circular yellow markings near upper end... *deserticola* **spec. nov.**
- Scutum (posterior to postpronotum) entirely dark brown to black laterally. Anepisternum without pale markings at upper end, completely dark brown to black 3
3. Scutellum almost entirely yellow, although sometimes darker along basal margin [careful rotation and good illumination of fly required] *gessi* Barraclough
- Scutellum entirely dark brown to black 4
4. Ocellar tubercle not or barely developed, not noticeably raised above upper eye margin ..
..... *capensis* Schlinger
- Ocellar tubercle well developed, prominently raised above eye (see e.g. Fig. 6) 5
5. Antennal tubercle prominent in profile, extending as far outwards as anterior margin of scape (Fig. 6). Scutellum (in dorsal view) smoothly rounded apically *montana* **spec. nov.**
- Antennal tubercle barely visible in profile. Scutellum (in dorsal view) apically protuberant with median indentation *parvacoronata* Barraclough

Astomella capensis Schlinger

Astomella capensis Schlinger, 1960: 464–466.

MATERIAL EXAMINED: SOUTH AFRICA: Natal: 1♂: Empangeni, 28°30'S, 31°45'E, 30.v.1987, P. Reavell, In garden (NMSA). Cape: Holotype ♂: Grahamstown, 1.vi.1940 (NMSA).

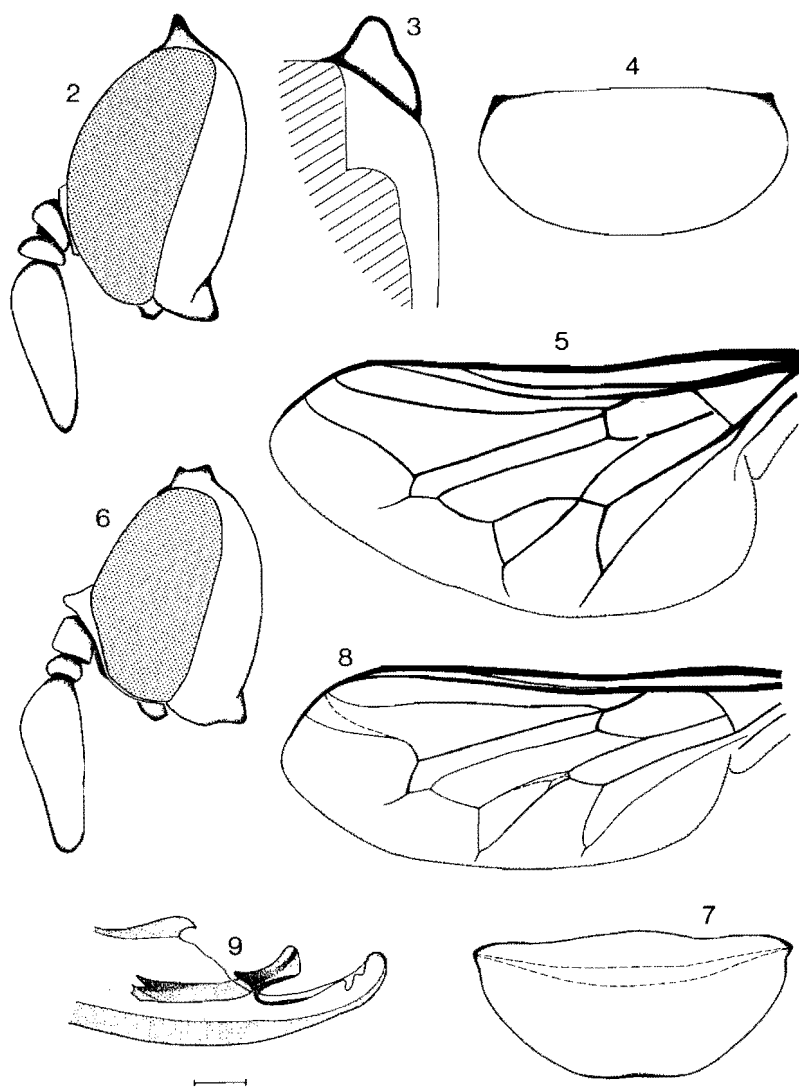
This species was previously recorded only from the type-locality (Grahamstown) and Alicedale, about 50 km further west in the eastern Cape Province (Barraclough 1984). I have now seen a third male in NMSA, this being the first record from Natal and representing the eastern limit of *Astomella*'s distribution in southern Africa (Fig. 10).

Astomella deserticola spec. nov., Figs 2–5.

MALE. Total length (14.2) mm; length of wing from extreme base (8.7) mm.

Head (Fig. 2): Eye and occiput black, although occiput with dense grey pollinosity. Ocellar tubercle moderately raised above upper eye margin, in profile markedly narrower apically, height about 1.0 X scape length, reduced and not markedly concave above. Eyes occupy about three- to four-fifths of head capsule. Antennal tubercle distinct, although only just visible in profile. Pedicel almost as long as scape, both segments mostly brown to black although pedicel paler apically, each with abundant short dark pile dorsally. Flagellum just less than 3.0 X combined length of scape and pedicel, apically relatively sharply pointed, almost 2.0 X as wide as pedicel in profile, mostly dark brown except paler along ventral margin. Eyes about 1.0 X scape length apart below antennal bases. Proboscis covering mostly black. Eye pile mostly dark in profile and slightly shorter anteriorly, although some pale hairing at lower and particularly upper extremes; occiput pile completely pale, about 1.5 X scape length below and reaching 2.0 X scape length on upper extent.

Thorax (Figs 3 & 4): Ground colour dark brown to black contrasted with



Figs 2–9. *Astomella* species. 2–5. *A. deserticola* **spec. nov.** 2. Head profile, hairing omitted. 3. Right anterolateral section of scutum posterior to postpronotum (stippled perimeter), showing extent of pale lateral margin. 4. Scutellum, dorsal view. 5. Wing. 6–9. *A. montana* **spec. nov.** 6. Head profile, hairing omitted. 7. Scutellum, dorsal view. 8. Wing, showing teratological venation (broken lines). 9. Aedeagal apex, lateral view. (Scale = 0.1 mm. Fig. 9).

yellow on proepisternal area, upper section of anepisternum (2 circular markings, anterior marking about twice as extensive as posterior one), and on entire postpronotum and scutellum. In addition scutum entirely pale along lateral and posterior margins, posterior margin narrowly pale anterior to scutellum, but much of postalar callus and equivalent width of lateral margin posterior to postpronotum strikingly pale, this pale region broadening anteriorly to form a right-angular medial extension (Fig. 3). Pile pale yellow, noticeably shorter and sparse or absent posteromedially on scutum, fairly conspicuously tufted on upper section of anepisternum, but absent on extreme ventral section of pleuron above mid and hind coxae and below posterior spiracle. Spiracles both white to pale yellow. Scutellum about 2,0 X as wide as long, virtually straight (not smoothly rounded) posteromedially (Fig. 4). Haltere stem and knob yellow-brown.

Legs: Fore coxa white to yellow, mid and hind coxae mostly white to yellow but partly dark brown on anterior surfaces; pile white and reaching 2,0 X scape length. Trochanters yellow; pile white and restricted to ventral surfaces, about 0,5 X coxal pile length. Femora yellow; pile white and mostly 0,7 X coxal pile length. Tibiae yellow; pile predominantly pale but mostly dark on apical half of hind tibia, very short except on ventral surface of hind tibia, here reaching 0,5 X femoral pile length; spurs mostly glossy dark brown, fore and mid spurs subequal in length to scape, hind spur 1,5 X scape length. Fore tarsus yellow, pile entirely pale; mid tarsus yellow, pile predominantly pale with a few dark dorsal hairs on apical half; hind tarsus dark yellow-brown, pile a mixture of dark and pale although predominantly dark dorsally, swollen along entire length relative to fore and mid tarsi and 2,0 X depth of these segments in profile. Claws predominantly black; pulvilli yellow.

Wing (Fig. 5): Entirely hyaline. Veins yellow or pale brown, except apical third of C dark brown to black. C without any noticeably longer hairing in first sector; R_1 with such hairing (pale) in basal two-fifths of first costal sector, this being at least 2,0 X length of costal hairing. Upper calypter white or pale yellow, wing base yellow-brown. Lower calypter virtually transparent, rim white or very pale yellow; pile mostly white, not longer on posterior surface.

Abdomen: Widest at anterior margin of T_2 . Terga very dark brown; posterior fasciae of T_2 - T_4 yellow. Fascia white on T_1 , although restricted to extreme posterolateral margins. Fasciae on T_2 - T_4 broadening laterally to occupy entire lateral margins, but these lateral pale areas narrowing on successive segments; dark ground colour restricted to anterior two-thirds of terga. T_5 without posterior fascia, although extreme posterolateral and entire lateral margins pale. Pile mostly white to yellow, except dark medially on sections of dark ground colour on T_3 and T_4 , medially on T_5 and over much of T_6 ; pile on T_2 profuse and longer than on successive terga, reaching 1,0-1,5 X length of anterior scutal pile; pile on T_3 and T_4 mostly short and profuse, although longest hairs just shorter than T_2 pile. Sternites mostly yellow, except brown on anterior two-thirds of S_5 and brown to dark brown on S_6 and S_7 ; pile white, short and sparse on all segments. [Terminalia not dissected from holotype, as this would possibly have detached either or both hind legs (left fore and mid legs already missing); aedeagal apex consequently not figured.]

Etymology. Refers to the relative aridity of the type-locality in southeastern Namibia, on the fringes of the Kalahari Desert.

Discussion. This species appears to have rather incongruous affinities, being unrelated to any of the southern African species, which all lack the strikingly pale scutal margins characteristic of *A. deserticola*. Such colouring (including the pale areas on the

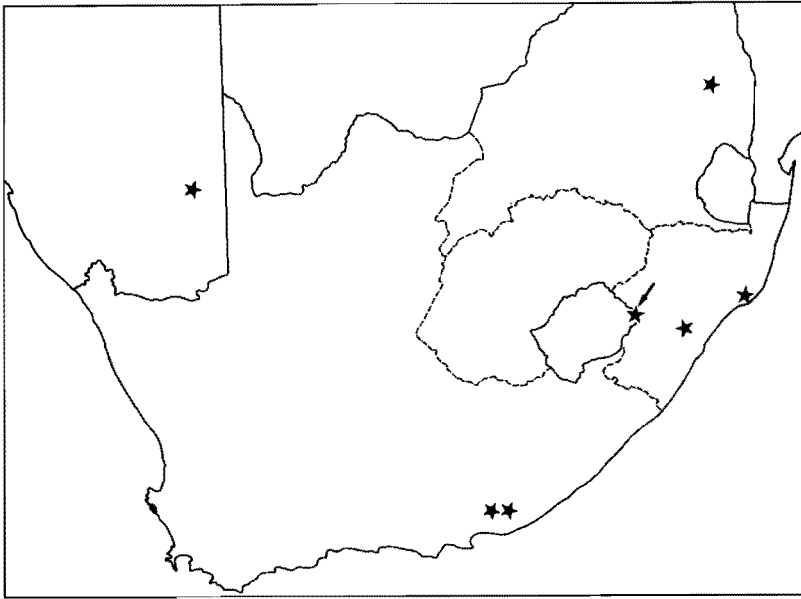


Fig. 10. Known distribution of *Astomella* in southern Africa. [The Namibian and arrowed South African localities are the type-localities of *A. deserticola* **spec. nov.** and *A. montana* **spec. nov.** respectively.]

upper part of the anepisternum) occurs also in *A. acuta* Schlinger, known only from northwestern Tanzania. The latter species (BMNH female holotype examined) also has a pale postpronotum and scutellum and is probably the closest relative of *A. deserticola* in the Afrotropical Region, although easily distinguished in having a strongly protuberant antennal tubercle and an acute projection on the inner dorsal margin of the postpronotum.

MATERIAL EXAMINED: Holotype, ♂: NAMIBIA: 'Kiries West' [26° 35'S, 18° 57'E]/S.W.A.; [on reverse side of same label] 'J. S. Brown/'Dec. 1925'. In SAMC.

Astomella gessi Barracclough

Astomella gessi Barracclough, 1984: 48–50.

MATERIAL EXAMINED: SOUTH AFRICA: Transvaal: 2♂ 1♀: Welgevonden Forest Station, near Mariepskop, xi.1987, G. L. Prinsloo (1♂ 1♀ SANC, 1♂ NMSA). Natal: Holotype ♂: Ashburton, 11.xi.1981, W. H. Chapman (NMSA); 1♂ 2♀: University of Natal, Ukulinga Research Farm, 10 km SE Pietermaritzburg, 18.ix–15.x.1985 (malaise trap), R. M. Miller (NMSA).

Discussion. This species is apparently fairly widespread east of 30° in South Africa, but it is not certain that the specimens from the eastern Transvaal are conspecific with the material collected just south of Pietermaritzburg, Natal. The Transvaal population appears to have a distinctively shaped aedeagal apex, and unlike specimens collected at or near the type-locality, have pale pile on the dorsal part of the eye and over much of T₃ and T₄ in both sexes. I consider that this is acceptable intraspecific geographical variation, although this can only be confirmed by the examination of further material between Pietermaritzburg and Mariepskop.

This is only the second Afrotropical species with associated males and females available for study. The females are similar to those of *A. minuta* in having the abdomen broader and more globular dorsally, and as with the latter species the female head is smaller in both dorsal and lateral views and the antennal flagellum is markedly narrower along its entire length with a sharply tapered apex. Other significant character states unique to the female include: flagellum with 6–10 dark hairs positioned dorsobasally on outer surface; T₄ entirely dark brown to black or with rather narrow, indistinct pale fascia along hind margin.

***Astomella montana* spec. nov., Figs 6–9.**

MALE. Total length 12.8 (11.4–11.7) mm; length of wing from extreme base 8.0 (7.4–7.7) mm.

Head (Fig. 6): Eye and occiput black. Ocellar tubercle moderately raised above upper eye margin, height about 0.8 (1.0) X scape length, concave above. Eyes occupy three- to four-fifths of head capsule. Antennal tubercle distinct, strikingly prominent in profile and extending as far outwards as anterior margin of scape. Pedicel half to two-thirds scape length, both segments entirely dark brown to black with abundant short dark pile dorsally. Flagellum noticeably less than 3.0 X combined length of scape and pedicel, apically fairly smoothly rounded, almost 2.0 X as wide as pedicel in profile, dark brown to black (pale brown dorso-apically) except yellow-brown ventrally near junction with pedicel. Eyes about 1.0 X scape length apart below antennal bases. Proboscis dark brown to black. Eye pile predominantly dark in profile and slightly shorter anteriorly, some pale hairing at upper and lower extremes; occiput pile completely pale, except mostly dark on ocellar tubercle, about 1.0–1.5 X scape length on lower extent but reaching almost 2.0 X scape length on upper third.

Thorax (Fig. 7): Dark brown to black with only postpronotum pale yellow. Pile white to dark yellow, noticeably shorter and rather sparse on posterior part of scutum, very sparse or absent on lower section of pleuron above mid and hind coxae and surrounding posterior spiracle. Spiracles both white to pale yellow. Scutellum about 2.0 X as wide as long, very slightly indented posteromedially (Fig. 7). Haltere stem mostly yellow, knob brown (black).

Legs: Fore coxa yellow, mid and hind coxae mostly dark brown to black; pile yellow on all surfaces, absent only on posterior surface of hind coxa, reaching 2.0 X scape length on some surfaces. Trochanters yellow, pile yellow and restricted mainly to ventral surfaces, about 0.3–0.5 X coxal pile length. Femora white to pale yellow, pile yellow, mostly 0.3–0.5 (0.8) X coxal pile length. Tibiae very pale yellow, except hind tibia slightly darker on apical half; pile predominantly dark (sometimes partly so on fore tibia), although paler ventrally, 0.2–0.5 X femoral pile length; spurs bordered with brown, fore spur subequal to scape length, mid and hind spurs 1.3 X and 1.5 X scape

length respectively. Fore tarsus mostly yellow, darker dorsally on apical 3 (2) segments, pile (mostly) dark, except partly (entirely) pale ventrally; mid tarsus partly yellow, mostly dark brown to black on dorsal sections of apical 3 (4) segments, pile mostly dark; hind tarsus mostly black, noticeably paler only on extreme base of basitarsus, pile entirely dark, swollen along entire length relative to fore and mid tarsi and almost 2.0 X depth of these segments in profile. Claws predominantly black; pulvilli yellow.

Wing (Fig. 8): Membrane very pale brown on apical two-thirds. Veins yellow or pale brown, but C and particularly apical four-fifths of R_1 dark brown. C with mixture of very short yellow and brown hairing in first sector; similar vestiture on R_1 , although restricted mostly to basal third of first costal sector and 2.0–3.0 X length of costal hairing. Upper calypter white, wing base dark brown. Lower calypter semi-opaque, rim white to very pale yellow; pile pale yellow, much longer on posterior surface.

Abdomen (Fig. 9): Widest at hind margin of T₂. Terga very dark brown to black; posterior fasciae of T₂–T₄ yellow, except pale brown laterally. Fascia white on T₁, very narrow, but occupying almost entire hind margin. Fasciae on T₂ and T₃ broadening laterally to occupy entire lateral margins; T₄ with similarly broad fascia occupying about posterior one-fifth medially (sometimes much narrower and occupying posterior one-seventh), narrowing laterally, but not absent on margins (occupying entire lateral margins). Pile white to yellow on T₁, very short and sparse; pile yellow on T₂, dense and reaching 1.3 X length of anterior scutal pile; pile on T₃ and T₄ mostly pale, but partly dark posteromedially, shorter and less profuse than on T₂; pile on T₅ and T₆ mostly dark although noticeably pale laterally, subequal in length to T₂ pile. Sternites dark brown, except noticeably white along hind margins of S₂–S₄ (S₂ yellow and S₃ mostly so, except medially); pile white to pale yellow, decreasing successively in length and density posterior to S₂. Aedeagal apex as in Fig. 9.

Etymology. *Montanus* (L.) = mountainous; refers to the high altitude (almost 2000 m) of the type-locality.

Discussion. This species is closely related to *A. parvacoronata* (the latter known only from the male holotype collected at Belmont Valley, Grahamstown). These two species appear to be the only closely related pair in the Afrotropical Region, although *A. montana* is readily distinguished from *A. parvacoronata* (and all other southern African species) in having a remarkably prominent antennal tubercle in profile (Fig. 6). This tubercle is barely visible in *A. parvacoronata* (see Fig. 18 in Barracough 1984). Other characters which reliably separate *A. montana* and *A. parvacoronata* are: scutellum shape in dorsal view (median region strongly protuberant and apically notched in *A. parvacoronata*, not protuberant and very slightly apically notched in *A. montana*); shape of the aedeagal apex, the apical half of which is much narrower in *A. montana* (cf. Fig. 9 and Fig. 22 (the latter in Barracough 1984)).

A point of interest is the teratological venation in both wings of the SANC paratype. In this specimen (refer to broken lines in Fig. 8) R_4 is bent abruptly upwards so that it virtually coalesces with R_{2+3} on the costal margin and cell r_{2+3} is closed, not widely open, as is typical of *Astomella* species. One wing even has a crossvein developed between R_{2+3} and R_4 near the costal margin. The junction between cells bm and m_3 is also modified (Fig. 8), but this may merely represent intraspecific variation (for example this also occurring in species of *Psilodera* Gray).

MATERIAL EXAMINED: Holotype, ♂: SOUTH AFRICA: 'Malaise/trap'; 'SOUTH AFRICA, Natal/Cathedral Peak area/above Mike's Pass/28.59S 29.14E.

1973m/19-23.i.1986/C. D. Eardley'. Paratypes: 2♂, same data. Holotype and 1♂ paratype in SANC; 1♂ paratype in NMSA (type number NM71).

ACKNOWLEDGEMENTS

I should like to thank Dr M. Mansell for the prolonged loan of *Astomella* material from SANC; Dr H. Robertson is also acknowledged for locating and loaning to me specimens deposited in SAMC. Mr J. Chainey (BMNH) assisted by loaning me the holotype of *A. acuta*. Dr J. G. H. Londt, Assistant Director of the Natal Museum, kindly reviewed the manuscript.

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Accepted 21 February 1991